

## I CLAIM:

1           1. A method of making a part with regions of different  
2 thickness from a plate workpiece having a pair of substantially  
3 parallel plate faces, the method comprising the steps of:

4           fitting the workpiece between a surface of a die and a  
5 substantially parallel surface of a punch, the die being formed  
6 at its surface with an opening;

7           relatively shifting the die and the punch parallel to  
8 the surfaces and faces and thereby compressing the workpiece to  
9 extrude the workpiece into the opening in the die surface while  
10 bracing the workpiece against the punch surface.

1           2. The method defined in claim 1 wherein the workpiece  
2 is compressed edgewise parallel to its faces between the die and  
3 the punch.

1           3. The method defined in claim 1 wherein the plate  
2 faces are in full surface contact with the die and punch surfaces  
3 except at the opening, the die and punch having confronting  
4 shoulders bearing on edges of the workpiece.

1           4. The method defined in claim 1 wherein the die  
2 surface is smoother than the punch surface, whereby the workpiece  
3 sticks to the punch and slides on the die.

1           5. The method defined in claim 1 wherein the die is  
2 formed with a plurality of the openings, whereby the workpiece is  
3 thickened at each of the openings.

1           6. The method defined in claim 1, further comprising  
2 the step of  
3 heating the plate workpiece before fitting it to the  
4 die and punch.

1           7. The method defined in claim 6 wherein the workpiece  
2 is heated while fitted to the die and punch after compression.

1           8. The apparatus defined in claim 1 wherein the plate  
2 workpiece is of metal.

1           9. The apparatus defined in claim 8 wherein the metal  
2 is aluminum or steel.

1           10. An apparatus for of making a part with regions of  
2 different thickness from a plate workpiece having a pair of  
3 substantially parallel plate faces, the apparatus comprising:

4           a die having a generally planar die surface and formed  
5 at the surface with an opening;

6           a punch having a generally planar punch surface  
7 parallel to and spaced from the die surface, the workpiece being  
8 fittable between the surfaces with its faces in full surface  
9 contact with the surfaces;

10          means for relatively shifting the punch and die  
11 relative to each other parallel to the punch and die surfaces and  
12 thereby compressing the workpiece to extrude the workpiece into  
13 the opening in the die surface while bracing the workpiece in  
14 surface contact against the die surface.

1           11. The apparatus defined in claim 10 wherein the  
2 punch and die have shoulders projecting generally perpendicular  
3 to the respective surfaces and engageable with edges of the plate  
4 workpiece.

1           12. The apparatus defined in claim 11 wherein the die  
2 surface is smoother than the punch surface.

1           13. The apparatus defined in claim 10 wherein the die  
2   and punch surfaces are spaced apart by a distance equal  
3   substantially to a thickness of the plate workpiece.

1           14. The apparatus defined in claim 10, further  
2   comprising:  
3       an abutment shiftable in the die transversely to the  
surfaces in the opening and having an end face movable between an  
advance position generally flush with the die surface and a  
retracted position offset back from the die surface; and  
      means for urging the abutment into the flush position.

1           15. The apparatus defined in claim 14 wherein the  
2   urging means is a spring.